the theory of Archigenesis. For if not through Archigenesis, whnce shall we derive this protoplasmic covering of the deepest sea-bottom?

Either the Monera were once for all, at the beginning of organic life on the earth, produced by Archigenesis—and hence—since Monera exist still to-day—they must have reproduced in a direct line unchanged for many million years; or, in the course of the earth's history, they have been produced by recurring acts of Archigenesis, and in this case there is no reason why this process should not occur at the present time. The latter view presents the fewest difficulties and exceptions to Prof. Haeckel. In any case the Monera still living at the present day point out to us the way to a correct understanding of the Origin of Life, and clear away the greatest difficulties which the hypothesis of Archigenesis previously presented. E. R. L.

SCIENTIFIC SERIALS

THE report of the meeting of Swiss Naturalists (*Schweizerische Naturforschende Gesellschaft*) in Solothurn on the 23-25 August, 1869, opens with an admirable presidential address on the progress of scientific investigation in Switzerland, by Prof. Lang. The reports of the sections contain numerous short notices of memoirs read, but among these are some of greater length and importance, such as a report by Dr. Hengi on his experiments in the culture of *Saturnia Yama-maya* and *S. mylitta*, a notice by M. F. Hermann on the use of Saussure's hair-hygrometer for scientific observations, a paper on creosote and other products by Prof. Völkel, a communication on fluorescence by Prof. Hagenbach, and a paper (printed in full) by Dr. von Fellenberg, containing analyses of some nephrites and jadeites, including a stone implement of the latter mineral from Möhringen-Steinberg, which he regarded as having been imported from the east. From his analyses of nephrites from different localities, it appears that they contain silica and magnesia in equal equivalents, but that the proportion of each of these to the lime varies as 7, 7½, 8, 9 : 3. Hence he regards them as forming not a definite mineral species, but a group of silicates of magnesia and lime formed by the metamorphosis of rocks of similar composition. He does not consider the nephrites allied to the amphiboles and augites. The memoirs include a report by Prof. Pictet de la Rive on the present state of the question as to the limits of the Jurassic and Cretaceous periods, a notice of which has already appeared in NATURE; an account of the Miocene Flora of Spitzbergen, by Prof. Oswald Heer; and a report on the investigation and preservation of the erratic blocks in Switzerland, by MM. A. Favre and L. Soret. An amusing account of the festal doings of the Society concludes the volume.

FROM the Natural History Society of Stralsund (Neu-Vorpommern) and Rügen, we have received the second annual part of their *Mittheilungen* containing the proceedings of the society for the year 1869. It contains a life and list of the works of Prof. A. E. Legnitz, by Prof. von Feilitsch; a description of the Island of Gottland, with a notice of the birds inhabiting it, by M. L. Holtz, unfortunately disfigured by some very absurd misprints; a notice on the proper heat of plants, by Dr. J. Romer, containing details of experiments made with *Philodendron pinnatifidum* Schott, from which it appears that the proper heat of this plant is much higher than stated by C. H. Schulz; and a paper (illustrated) on the itch-mites of fowls by Prof. Finsterberg. In the last-mentioned paper the author describes a species of mite inhabiting the feet of fowls, for which he proposes the formation of a new genus, *Knemidokoptes* (recte *Cnemidocoptes*). He names the species *K. viviparus*, as it produces living young.

THE last part of the *Archives Néerlandaises des Sciences Exactes et Naturelles à Harlem* for 1870 contains the following papers:—J. A. Groshaus on the Specific Heats of Solids and Liquids, which is a continuation of his former papers published in the same journal, in which he confirms Kopp's results in obtaining a constant when the specific heat of every substance is multiplied with its atomic weight, the constant being 6·3 to 6·5.—C. K. Hoffmann and H. Weijenbergh, jr., on the position of Chiromys (The Aye-Aye of Madagascar) in the natural classification. This is an elaborate memoir which was crowned by the society in 1869, and treats of all the characters in detail, their final decision being to make the following classification: Mammalia, Order ii. Quadrumana, Sub-order ii. Prosimiæ, Families: 1, Lemurini; 2, Nyeticebini; 3, Macrotarsi; 4, Microtarsi. The fourth family is distinguished by the tarsal bones more or less elongated (*allongés*), and by difference in the dentary systems, especially in the character of the incisor teeth. In common with Macrotarsi they have the tail, long large eyes directed in front, and large ears, and they feed chiefly on insects. Of this family two genera are given; Microcebus Geoff. and Chiromys Cuv., two species of the first one found in Madagascar, and one of the second, the common Aye-Aye.—M. G. F. W. Baehr gives a note on the Results of the Mathematical Study of the Movements of the Eye.—M. H. H. von Zouteveen on the Petrified Forest of Cairo, and by the same author on the Synthesis of Sulphocyanate of Ammonium.—M. Van der Willigen on Holtz's Electrical Machine.—M. A. C. Oudemans, jr., on the Volumetric Estimation of Iron by Hyposulphite of Sodium.—M. H. Weijenbergh, jr., on Parthenogenesis among the Lepidoptera.—M. C. Ritsema on the Origin and Development of *Periphyllus testudo* v.d.H.; and lastly a report on the Purification of the Air of Hospitals by the Combustion of the Organic Germs, by MM. J. van Genns and L. H. von Baumhauer. This is the report of an investigation undertaken at the instance of the Dutch Government to determine if the apparatus devised by M. Woestyn, of Paris, completely destroy all vital properties in the germs. They report that the apparatus contains nothing new, and that it does not effect its purpose any better than the ordinary methods in use.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 19.—"Modification of Wheatstone's Bridge to find the Resistance of a Galvanometer Coil from a single deflection of its own needle," by Prof. Sir William Thomson, F.R.S. In any useful arrangement in which a galvanometer or electrometer and a galvanic element or battery are connected, through whatever trains or network of conductors, let the galvanometer and battery be interchanged. Another arrangement is obtained which will probably be useful for a very different, although reciprocally related object. Hence, as soon as I learned from Mr. Mance his admirable method of measuring the internal resistance of a galvanic element (that described in the first of his two preceding papers), it occurred to me that the reciprocal arrangement would afford a means of finding the resistance of a galvanometer-coil, from a single deflection of its own needle, by a galvanic element of unknown resistance. The resulting method proves to be of such extreme simplicity that it would be incredible that it had not occurred to any one before, were it not that I fail to find any trace of it published in books or papers; and that personal inquiries of the best informed electricians of this country have shown that, in this country at least, it is a novelty. It consists simply in making the galvanometer-coil one of the four conductors of a Wheatstone's bridge, and adjusting, as usual, to get the zero of current when the bridge contact is made, with only this difference, that the test of the zero is not by a galvanometer in the bridge showing no deflection, but by the galvanometer itself, the resistance of whose coil is to be measured, showing an unchanged deflection. Neither diagram nor further explanation is necessary to make this understood to any one who knows Wheatstone's bridge.

Zoological Society, February 21.—Mr. Osbert Salvin, F.Z.S., in the chair. The Secretary announced the birth of a young Hippopotamus in the Society's Gardens, which had taken place that day, being the first occurrence of this event in England, although this animal had previously bred in some of the Continental Gardens.—Mr. Sclater exhibited and made remarks upon the tusk of an Indian elephant, which appeared to have been attacked by parasites.—The Secretary exhibited, on behalf of Mr. E. Ward, F.Z.S., a remarkably fine series of heads and horns of sheep and other wild animals, which had been collected in Ladahk by Mr. George Landseer.—A communication was read from Dr. W. Peters, F.M.Z.S., containing a note on the *Tænia* from the Rhinoceros, in reference to a previous communication from Dr. Murie, to the society, upon the same subject.—A communication was read from Mr. J. H. Gurney, F.Z.S., containing remarks on certain species of Abyssinian birds.—A communication was read from Dr. J. Anderson, C.M.Z.S., containing notes on certain Indian reptiles belonging to the collection of the Indian Museum, Calcutta.—A second communication from Dr. Anderson contained the descriptions of eight new species of birds, recently collected by him during the Yunan expedition.—A paper was read by Mr. W. C. Atkinson, containing descriptions of some new species of Diurnal Lepidoptera, discovered in Yunan by Dr. Anderson during the same expedition.—The Secretary communicated a paper by Mr. Edward Bartlett, containing observations on the habits and distribution of the monkeys of Eastern Peru, as observed during a recent four years' sojourn on the Upper Amazons.

Geological Society, February 8.—Mr. Joseph Prestwich, F.R.S., president, in the chair. 1. "On the Punfield Formation," by Mr. John W. Judd. Those formations, which have been deposited under *fluvio-marine* conditions, and which yield at the same time marine, fresh-water, and terrestrial fossils, are of especial interest to the geologist, as they furnish him with a means of correlating the great fresh-water systems of strata with those of marine origin. At the bottom of the Wealden we have one such fluvio-marine series, the well-known Purbeck formation; at its summit is another, less known, but not less important, for which the name of "Punfield Formation" is now suggested. Some of the fossils of the latter were first brought under the notice of geologists by Mr. Godwin-Austen in 1850, and their peculiarities have since been the subject of remark by Prof. E. Forbes, Sir C. Lyell and others. The typical section of the beds is at Punfield Cove, in the Isle of Purbeck, where they are about 160 feet thick, and include several bands with marine shells. The lowest and most remarkable of these yields about forty well-defined species, many of which, as well as one of the genera, are quite new to this country. A section somewhat similar to that of Punfield is seen at Worborrow Bay. In the Isle of Wight, at Compton, Brixton, and Sandown Bays, similar fluvio-marine beds are found at the top of the Wealden, and attain to a thickness of 230 feet. The marine bands here, however, yield but a very scanty fauna. Indications of the existence of beds of the same character and in a similar position are found in the district of the Weald. While the Purbeck formation exhibits the gradual passage of the marine Portlandian into the freshwater Wealden, the Punfield formation shows the transition of the latter into the marine Upper Neocomian (Lower Greensand). Thus we are led to conclude that the epoch of the English Wealden commenced before the close of the Jurassic period, lasted through the whole of the Tithonian and of the Lower and Middle Neocomian, and only came to a close at the commencement of the Upper Neocomian. In tracing the Cretaceous strata proper from east to west, they are found to undergo great modification, while the Neocomian and Wealden, which they overlap through unconformity, besides being greatly changed in character, thin out very rapidly. On stratigraphical and palæontological evidence, the Punfield formation is clearly referable to the upper part of the Middle Neocomian. Its fauna has remarkably close analogies with that of the great coal-bearing formation of eastern Spain, which is of vast thickness and great economic value. The claim of the Punfield beds, equally with the similarly situated Purbeck series, to rank as a distinct formation, is founded on the distinctness of their mineralogical characters, their great thickness, the fact of their yielding a considerable and very well characterised fauna, and of their being the equivalent of a highly important foreign series. The president remarked that the limited amount of fresh-water formations in this country was an obstacle to their correlation, and stated that Constant Prevost had endeavoured to correlate the secondary fresh-water and marine formations. Mr. Godwin-Austen remarked upon the thinning out of the Lower Greensand, especially in France; upon the imperfection of our knowledge of the great Cretaceous formation, and upon the probability of the intercalation of fresh-water conditions in the Lower Greensand. The formation at Punfield seemed to present an intercalation of marine between purely fresh-water conditions. He indicated how a slight change of level might have intercalated marine conditions in the Wealden. The deposition of the White Chalk and Oolite occupied enormous periods (in both cases purely marine), during which the northern hemisphere was a great northern ocean; and as the distribution of land and water was due to the operation of great cosmical laws, the duration of terrestrial and of the intermediate fresh water conditions was probably of equal length. Mr. Judd, in reply, said that he did not propose the term Punfield formation as a definitive term, but only as a matter of convenience. He believed that strata could be positively identified by he organic remains contained in them, although the method may have been grossly abused. Physical investigations alone led to nothing but confusion, as might be seen by the stratigraphical attempts of the predecessors of William Smith. The name *Vicarya* for the shell which had been referred to was only provisionally adopted, on the authority of De Verneuil and other writers. 2. "Some remarks on the Denudation of the Oolites of the Bath district, with a theory on the Denudation of Oolites generally." By Mr. W. S. Mitchell. The author briefly referred to the theory according to which oolitic deposits were supposed to have been originally spread out in continuous sheets over the country which they occupy, and to owe their division into separate hills to the action of denudation after their original deposition and consolidation. He suggested, as an equally probable hypothesis, that whilst the marls and clays of oolitic areas were probably originally deposited in continuous beds, the limestones in many cases may never have extended beyond the areas now occupied by them. He described the beds of limestone in the oolitic hills as thinning out towards the valleys on all sides, maintained that the limestones owed their origin to coral reefs, and cited several descriptions of coral islands by Prof. Jukes, to show the agreement in their structure with that which he ascribed to the oolitic hills. He assumed that in the event of a coral-area becoming one of sedimentary deposition, the sedimentary deposit would preserve intact the contour of the coral islands, and inferred that this has been the case in the Bath district, so that the Great Oolite cappings of the hills of that area may represent the original contours of coral islands, exposed by the denudation of the Bradford clay. The amount of denudation undergone by the Great Oolite limestone he considered to be very small. The Inferior Oolite, on the contrary, he believed to have suffered denudation, and he considered that the course of the valleys formed by this agent was dependent on the form of the limestones capping the hills. Prof. Morris did not consider that the author's views as to the oolitic masses round Bath being originally isolated coral banks with clay beds, although suggestive, were quite satisfactory. He pointed out that the strata on each side the valleys were similar in structure, mineral character, and fossil contents, and were once continuous; and the present intervening deep valleys were rather due to the movements which the area had undergone in producing lines of weak resistance, subsequently assisted by the erosive action of percolating and running water, both in excavating and undermining the harder rocks, so as to cause them to bend towards the hill-sides, or fall in larger or smaller masses on their slopes. Mr. Mitchell, in reply, stated that he had seen both sides of what he regarded as coral reefs. He remarked that his hypothesis was arrived at by deduction, by inferring from observations on existing coral-reefs that those of the Oolites must have been covered up as islands. He remarked that if the oolitic beds had slipped, as described, upon the underlying clays, they could hardly range on opposite sides of the valleys. He noticed that the action of water in covering the blocks of Oolite with crystallised carbonate of lime would be protective, and remarked that the surface of the reefs was virtually a sea-bottom on which mollusca lived, so that their occurrence at corresponding levels in different hills was not to be wondered at.

February 17.—Mr. Joseph Prestwich, F.R.S., president, in the chair.—The Secretary read the reports of the Council, of the Library and Museum Committee, and of the auditors. The general position of the Society, as shown by the state of its finances and the continued increase in the number of Fellows, was said to be very satisfactory. In presenting the Wollaston Gold Medal to Prof. Ramsay, F.R.S., F.G.S., the President spoke as follows—"Prof. Ramsay,—I have great pleasure in presenting you with the Wollaston Medal, which has this year been awarded to you by the Council of the Society, in recognition of your many researches in practical and in theoretical geology. Distinguished as your services have been in connection with the Geological Survey since you entered upon it as the Assistant Geologist of Sir Henry De la Beche in 1841, and more particularly since your appointment as Local Director in 1845, during which period you have superintended and carried out the admirably minute style of mapping now general on the survey, and done so much in training its members in the field, you have not less distinguished yourself by your investigations of the higher problems involved in the study of geology. Your first work was on the Isle of Arran; and although then only a beginner, you, instead of taking the rocks to be what they looked, worked out what they were, and gave a new and independent reading of them, which has since in great part proved to be the right one. In 1846 your well-known memoir, 'On the Denudation of South Wales and the adjacent Counties of England,' showed the enormous amount of denudation that the Palæozoic rocks had undergone before the deposition of the New Red Sandstone. At subsequent periods you dwelt on the power that produced 'Plains of Marine Denudation,' a term introduced, I believe, by yourself, and showed in all cases, by a series of true and beautiful sections, how this has operated in planing across the older strata, and how valleys had been scooped out by subsequent aqueous causes in the great plains so formed. Whilst unravelling the complicated interior phenomena of the Welsh rocks, you were not unmindful of the very different order of phenomena exhibited on their exterior surfaces. Here you showed the vast extent and power of ice-action, and what a glacier land Wales once was. Reasoning from the present to the past, you also boldly pushed your ice-batteries far back into geological time, and were the first to bring them to bear on rocks of Permian age. That advanced post you long had to hold alone; but other geologists have since followed your lead, and we have even lately had evidence in the same direction from Southern Africa, where it is asserted that boulders and glaciated surfaces have been found at the base of the Karoo formation of supposed Jurassic age. You have also held a prominent place among those who, by their public teaching, have done so much during the last twenty years to advance the cause of our science. To myself, personally, whose geological career has run nearly parallel in time with your own, it is a source of much pleasure that it has fallen to my lot to hand you this, the highest testimonial the Society has to bestow."—Prof. Ramsay made the following reply:—"Mr. President,—I cannot say whether I am more pleased or surprised by the unexpected award to me of the Wollaston Medal by the Council of this Society. Pleased I well may be, not because I ever worked for this or any other honour, but because I feel a sense of satisfaction that the work on which I have been engaged for the last thirty years has been esteemed by my friends and fellows of the Council of the Society so highly, that they have deemed me a fit recipient of this honour. It is also a special satisfaction to me that this award has been bestowed by the hand of one of my oldest geological friends, who is so universally esteemed and beloved, and is himself so distinguished a contributor to physical and other branches of our science. My first endeavour in geology (the con-construction of a geological map and model of Arran) necessarily drew my attention to the physical part of our science; and when, consequent upon that work, I was, through the intervention of my old and constant friend, Sir Roderick Murchison, appointed by Sir Henry De la Beche to the Geological Survey of Great Britain, my whole subsequent life was thereafter necessarily involved in questions of physical geology, for no man can work on or conduct the field-work of such a survey who does not, aided by palæontology, necessarily make that his first aim. If some of my theories, induced by that work, were long in being recognised, the recognition has been all the more welcome when it came. Probably I never should have been able to do what I have done but for the wise example of my old master, Sir Henry himself, in his time the best thinker in England on the physical branch of our science, and to whose remarkable work, 'Researches in Theoretical Geology,' all geologists are to this day indebted. The papers which I have written are mere offshoots from my heavier work on the Geological Survey. Perhaps they are enough for the readers; but I wish they had been more numerous, for I certainly have had many more in my mind. Two of these, on old physical geographies of the world, I have lately given to the Society; and if they should be printed, I shall be well pleased should they soon or late be found worthy. The present physical geography of the world is but the sequel of older physical geographies; and to make out the history of these is one of the ultimate aims of geology. These are the subjects I have striven to master in part. I consider your award as a sign that I have had some success; and if, before I cease to work, I have a little more, I may be well content."—The President then presented the Balance of the Proceeds of the Wollaston Donation Fund to Mr. Robert Etheridge, F.G.S., in aid of the publication of his great stratigraphical "Catalogue of British Fossils," and addressed him as follows:—"Mr. Etheridge,—The Council of the Society has awarded to you the Proceeds of the Wollaston Fund, to aid in prosecuting your valuable work on the fossils of the British Islands, stratigraphically arranged. In this work, on which you have been engaged during the last eight years, and which occupies nine volumes of MS., representing as many geological groups, you give the natural history lists of each group, and trace the history of each species both in time and space. Of the magnitude of the work few can have any idea, nor would many have an idea of the marvellous extent of past life in our small portion of the globe without a comparison of our recent fauna with those (necessarily incomplete, because only partly accessible) which you have enumerated in your most useful lists. This comparison shows:—

	Polyzoa. Zoophytes. Echinoderms.	Crustacea.	Mollusca.	Fishes.	Reptilia.	Birds.	Mammalia.	Plants.	Total.
Number of Species in the existing fauna and flora of Gt. Britain	616	278	567	263	15	354	76	1820	3,989
Number of Species found fossil in Gt. Britain . . .	2574	746	7091	815	224	12	172	819	12,453

I trust that this work will not be allowed to remain in MS., and that, presuming you will begin with the oldest, we may soon look for an instalment in the fauna of the Palæozoic rocks. I have much pleasure in presenting you with this token of the importance which the Geological Society attaches to your labours."—Mr. Etheridge made the following reply:—"I have great satisfaction in receiving from you, Sir, and the Council of the Geological Society, the award of the Wollaston Fund. It is given for work known to be nearly done, and faith in its completion. The time and labour devoted to my book upon the 'Stratigraphical Arrangement of the British Fossils' has extended over nearly nine years of incessant work, and has been an arduous, yet pleasant undertaking, now made lighter by the recognition of those who know and value the researches made for so extensive a catalogue of the British organic remains, now numbering nearly 13,000 species. It is this estimation of my labour by the Council and Society that tends to increase the desire to make my work as perfect as possible, well knowing how difficult, if not impossible, it is to do so. This acknowledgment, Sir, from your hands will stimulate me to finish my researches into the literature of the British species, and their history through space and time throughout Europe."—The President then proceeded to read his anniversary address, in which he discussed in considerable details the bearing of the recent deep-sea dredging operations upon geological reasoning. The address was prefaced by biographical notices of deceased fellows, including Sir Proby Cautley, Sir Frederick Pollock, Mr. Robert Hutton, and Prof. Gustav Bischoff.—The ballot for the Council and Officers was taken, and the following were duly elected for the ensuing year:—President: Joseph Prestwich, F.R.S.. Vice-presidents: Sir P. de M. G. Egerton, M.P., F.R.S., Prof. T. H. Huxley, F.R.S., Sir Charles Lyell, Bart., F.R.S., Prof. John Morris. Secretaries: John Evans, F.R.S., David Forbes, F.R.S. Foreign Secretary: Prof. D. T. Ansted, F.R.S. Treasurer: J. Gwyn Jeffreys, F.R.S. Council: Prof. D. T. Ansted, F.R.S., Dr. W. B. Carpenter, F.R.S., William Carruthers, W. Boyd Dawkins, F.R.S., Prof. P. Martin Duncan, F.R.S., Sir P. de M. G. Egerton, Bart., F.R.S., John Evans, F.R.S., David Forbes, F.R.S., J. Wickham Flower, Capt. Douglas Galton, C.B., F.R.S., R. A. C. Godwin-Austen, F.R.S., J. Whitaker Hulke, F.R.S., Prof. T. H. Huxley, F.R.S., J. Gwyn Jeffreys, F.R.S., Sir Charles Lyell, Bart., F.R.S., C. J. A. Meyer, Prof. John Morris, Joseph Prestwich, F.R.S., Prof. A. C. Ramsay, F.R.S., R. H. Scott, F.R.S., Prof. J. Tennant, Rev. Thomas Wiltshire, Henry Woodward.

London Mathematical Society, Thursday, Feb. 9.—Mr. W. Spottiswoode, President, in the chair. Mr. C. R. Hodgson, B.A., was proposed for election, and the Rev. J. Wolstenholme and Mr. R. B. Hayward, of Harrow, were elected members. Prof. Cayley made a communication "On an Analytical Theorem from a New Point of View," and also a second communication "On a Problem in the Calculus of Variations." The problem is, $z = \frac{1}{3}(3x - y^2)y$, to find v a function of x such that $\int z\,dx =$ maximum or minimum, subject to a given condition $\int y dx = C$ (the limits of each integral being x_1 x_0 where these quantities are each positive, and $x_1 > x_0$). The ordinary method of solution gives

$$y^2 = x + \lambda, \text{ for}$$

$$\text{where } (x_1 + \lambda)^{\frac{3}{2}} - (x_0 + \lambda)^{\frac{2}{3}} = \tfrac{3}{2}\,\mathrm{C}.$$

So long as c is not less than $(x_1 - x_0)\,\frac{3}{2}$, there is a real value of λ, but for a smaller value of c there is no real value. The difficulty arising in this last case is somewhat illustrated by replacing the original problem by a like problem of ordinary maxima and minima; viz., $x_1, x_2, \quad . \quad . \quad . \quad x^n$ being given positive values of x, in the order of increasing magnitude—and if in general

$$z_i = \tfrac{1}{3}\,(3x_i - y_i^2)\,y_i,$$

then the problem is to find y_i a function of x_i, such that Σz_1 = max. or min., subject to the condition $\Sigma y_i = c$. We have here $y_i^2 = x_i + \lambda$, where λ is then to be determined by the condition $\Sigma y_i = c$; the remainder of the investigation turns on the question of the sign

$$y_i = +\sqrt{x_i + \lambda} \text{ or } y_i = -\sqrt{x_i + \lambda}$$

to be taken for the several values of i respectively.—Prof. Henrici exhibited a plaster model of a tubular surface of the 6th order, which may be generated in either of the two following modes. Either a sphere of constant radius moves with its centre on a parabola, or it rolls along the same parabola always touching both its branches. The two envelopes thus produced differ in position only. The second mode of generation shows that the surface has a nodal curve, which is a parabola congruent to that on which the centre of the sphere moves; but in a plane perpendicular to it. Through a part of it only do real sheets of the surface pass. There is also a cuspidal curve of the 6th order, which has two cusps. The nodal curve passes through them, and has at these cusps the same tangents. The equation to the surface is

$$(27\,py^2 + 9\,x\,\mathrm{K} - x^3)^2 = (x^2 + 3\mathrm{K})^3$$

where

$$\mathrm{K} = (x + 2p)^2 + y^2 + z^2 - r^2$$

r = radius of the sphere and $4p$ is the parameter of the parabola. The equations to the parabola, on which the centre of the sphere moves, are

$$y^2 = 4p\,(x + 2p),\ z = 0\,;$$

those of the nodal curve,

$$y = 0,\ z^2 = -4px + r^2 - 4p^2\,;$$

the equations to the cuspidal curve are

$$27py^2 - 4x^3 = 0,\ x^2 + 3k = 0\,;$$

the first is a cylinder, which cuts the plane $z = 0$ in the evolute of the parabola, the second represents an ellipsoid of revolution. The model was constructed to the scale

$$p = \tfrac{1}{20},\ r = 2 \text{ inches.}$$

It was agreed, on the suggestion of Dr. Hirst, that Prof. Henrici should order a second model to be cast for the use of the society. Mr. Merrifield, F.R.S. laid the following statement before the society. "If the equation of a surface be

$$Z = \mathrm{F}(x\,y) \qquad (1)$$

it is very well known that the condition that it should be a ruled surface is that

$$\left(\lambda\frac{d}{dx} + \mu\frac{d}{dy}\right)^2 z \qquad (2)$$

and

$$\left(\lambda\frac{d}{dx} + \mu\frac{d}{dy}\right)^3 \qquad (3)$$

should have a common factor of the form $A\lambda + B\mu$; and also that the condition of its being developable is that (2) should have two equal factors of that form. I have found upon actual trial that for a conical surface (3) will have two equal factors, and for a cylindrical surface, three equal factors; that is to say, if we write, $\alpha = \dfrac{d^3z}{dx^3}$, $\beta = \dfrac{d^3z}{dx^2dy}$ &c., we have for a conical surface

$$(\alpha\,\delta - \beta\,\gamma)^2 = (\alpha\gamma - \beta^2)\,(\beta\,\delta - \gamma^2)$$

and for a cylindrical surface we have separately

$$(\alpha\,\delta - \beta\,\gamma) = 0,\ (\alpha\,\gamma - \beta^2) = 0,\ \beta\,\delta - \gamma^2 = 0$$

If, following Monge, we regard the surface as traced out by a right line moving on three director curves, the condition of two or three equal roots is evidently the same as that, out of the three characteristics passing through a point, two or three should become coincident. I have not yet had time to look into the question whether the converse of the proposition is true, viz., whether the introduction of the condition of developability ($rt = s^2$) necessarily reduces the surface, in which two or three of the characteristics coincide, to a cone or cylinder." The president and members present expressed their wish that Mr. Merrifield would be able to find time for the consideration of this converse proposition. Dr. Hirst then made some remarks on the connection between the correlation of two planes, as described in his last communication to the Society, and Sturm's solution of the problem of projectivity, as given by him in his memoir on the subject, published in the *Mathematische Annalen*, Vol. i., p. 533.

Linnean Society, February 16.—Mr. G. Busk, Vice-president, in the chair. Dr. J. D. Hooker presented to the Society on behalf of a committee appointed for the purpose, a half-length portrait of the President, Mr. G. Bentham, the expense of which had been defrayed by a subscription raised among the fellows of the Society. The following papers were then read, the interest of which was purely technical:—On Tremellineous Fungi and their Analogues, by L. and C. Tulasne; Bryological Remarks by Dr. S. O. Lindberg.

Entomological Society, February 20.—Mr. A. R. Wallace, president, in the chair. Mr. Bond exhibited a hybrid between *Bombyx Pernyi* and *B. yama-mai*, two of the larger silk-worm moths; this individual was of the colour of the one parent with the form of the other. He also exhibited an example of *Bombyx mori*, bred by Dr. Wallace, still retaining the larval head. Mr. McLachlan called attention to the first-recorded instance of a similar arrest of development, being a paper by O. F. Müller in "Der Naturforscher" for 1871. Mr. Smith mentioned that a common Egyptian wasp, *Rhynchium brunneum*, obliterated, by its nest, the inscriptions on the ancient monuments in that country; and he exhibited an example of the same wasp which had been found in the folds of the covering of a mummy, showing that the same species had inhabited Egypt for many ages. Mr. Smith further alluded to a passage in Pepys's Diary, dated May 1665, in which the writer narrated how he had seen a glass-hive where the bees could be seen at work, proving that observatory hives were not a modern invention. Mr. Müller read a paper "On the Dispersion of Non-migratory insects by Atmospheric Agencies," in which he had collected together a number of records of showers of insects after violent storms, and at sea at long distances from land; and he was of opinion that these agencies played a considerable part in the geographical distribution of insect life, though, no doubt, in many cases, the species thus involuntarily dispersed died out from inability to cope with the pre-existent denizens of the localities to which they were driven. Mr. H. Jenner-Fust communicated a supplement to his treatise on the geographical distribution in these islands of the indigenous Lepidoptera.

DUBLIN

Royal Irish Academy, Feb. 13.—Rev. J. H. Jellett, B.D., president, in the chair.—Dr. Ferguson read a paper "On the Difficulties attendant on the Transcription of Ogham Legends, and the Means of Avoiding them." Leave was given to Mr. Charles E. Burton to read notes "On the Results obtained by the Agosta Sicily Expedition to Observe the recent Solar Eclipse."—A paper was read by Profs. W. King and T. H. Rowney, "On the Geological and Microscopical Structure of the Serpentine Marble or Ophite of Skye."—Papers "On Eozöon Canadense," by Principal Dawson, and on Messrs. King and Rowney's paper "On Eozöon Canadense," by Dr. T. S. Hunt, were deferred to the meeting of the 27th inst. when the discussion of all the papers on this subject will be taken.—Rev. President Henry, D.D., Belfast, H. Dix Hutton, LL.B., and T. W. Ellison Macartney were elected members of the Academy, and Prof. Traquair was admitted a member.—Sir W. Wilde presented on behalf of the Earl of Mayo, a collection of ancient Indian Coins, for which the marked thanks of the meeting were voted.

HOBART TOWN

Royal Society of Tasmania, October 11, 1870.—His Excellency, C. Du Cane, Esq., President, in the chair. The Secretary read some "Notes on an experiment with the fumes of sulphur, and of other methods for the destruction of rabbits in their burrows," by W. Archer, Esq., F.L.S. The fumes were forced into a burrow by means of bellows, attached to a receptacle in which the sulphur was burned; and that this was effectually done was proved by the escape of sulphurous vapour from the bolt-holes. When the burrow was afterwards opened, however, no trace of the fumes was left, nor were the animals destroyed. The experiment was recorded as a "guide or warning to others who may be induced to try further experiments with the fumes of sulphur, or with any other vapour." (Carbonic acid gas would not become condensed, and it would be fatal to animal life, but its use would probably be much too expensive). Mr. Abbott read a paper "On the Sun and its Office in the Universe." Some discussion of a conversational character having taken place, Mr. M. Allport begged to call the attention of the meeting to the fish presented by Mr. Wise (presentation No. 8), on account of its high scientific importance, as furnishing a complete answer to the theory raised by Dr. Günther in reference to the salmon first sent to England. The Doctor then assumed that the fish sent was hatched from one of the eggs imported to England in 1866. This assumption was met by the statement that the fry unnaturally detained in fresh water had reached a higher state of development than the smolt sent to England, and as the fish now presented was but just assuming the smolt stage, all the arguments used in reference to the smolts first caught apply with tenfold force to this specimen. It was, moreover, fortunate that they had in the Museum one of the fry hatched from the English eggs received per *Lincolnshire* in 1866, and which died in the spring of 1867. Upon comparing this with the fish now caught, it would be found that they accorded with one another so closely, as to leave little doubt of their identity in species. No report had yet been received from England as to the smolt last sent, though they had heard of its safe arrival. Mr. Allport further observed that Mr. Youl, in writing to Sir Robert Officer, had expressed a wish that the Salmon Commissioners should make it publicly known that after careful examination he entirely concurred with Dr. Günther in the opinion that the specimen first sent to England was a Salmon trout (*Salmo trutta.*)

BERLIN

Royal Prussian Academy of Sciences, June 2, 1870.—Prof. G. Rose communicated a long and elaborate memoir on the connection between the hemihedric crystalline form and thermo-electrical properties in iron-pyrites and cobalt-glance, with some remarks on the theory of hemihedric forms in general; and Prof. Dove read a paper on the reference of the annual curve of temperature to the conditions upon which it depends.

June 16.—M. Kummer read a paper on the simplest representation of the complex numbers formed from unitary roots, which can be effected by multiplication with unities. Prof. W. Peters read a description of *Propithecus Deckenii*, a new species of Lemuroidea from Madagascar; it is the species which had previously been identified by him with *P. diadema* Bennett.

June 23.—A paper was read on the Morphology of *Chonidriopsis cœrulescens*, Crouan, and the optical phenomena presented by that Alga, by Dr. Leopold Kny. The author described in some detail the peculiar cell development and mode of ramification of the plant, and noticed more briefly the structure of the reproductive organs. The peculiar colour presented by the plant is produced by the contents of the outermost cortical layer of cells, and is due to the presence in them of certain corpuscles which have the faculty of reflecting blue light. Prof. du Bois Reymond read a supplement to his memoir on the aperiodic movement of muffled magnets.

June 27.—Prof. C. Rammelsberg read some contributions to the knowledge of meteorites. He first communicated some remarks on the analysis of meteorites, relating to a more recent process for the separation of nickel from iron, to the separation and determination of meteoric iron in stony meteorites, and to the analysis of the silicates, and then furnished analyses of meteoric irons, of the pallasite of Brahin, and of the chondrites of Pultusk, Richmond, and Iowa. His analyses of these chondrites and of that of Klein Wenden, lead him to the conclusion that they all contain only two silicates, olivine and broncite, a result which he finds to be confirmed by other analyses, and he affirms, that mesosiderite and chondrite do not differ petrographically but only in structure.

BOOKS RECEIVED

ENGLISH.—The Descent of Man, 2 vols.: C. Darwin (Murray).—The General Structure of the Animal Kingdom, 4th edition (Van Voorst).—A Treatise on Smoky Chimneys: F. Edwards (Longmans).—Mathematical Papers of the late George Green: N. M. Ferrers (Macmillan).—A Synopsis of the Family Unionidæ: Isaac Lee (H. C. Lea, Philadelphia).—Thesaurus Syriacus, fasc. ii.

DIARY

THURSDAY, MARCH 2.

ROYAL SOCIETY, at 8.30.—Further Experiments on the Effect of Diet and Exercise on the Elimination of Nitrogen: Dr. Parkes, F.R.S.—Magnetic Observations made during a Voyage from St. Petersburg to the Coasts of the Arctic Sea, in the Summer of 1870: Capt. Belavenetz, I.R.N.

SOCIETY OF ANTIQUARIES, at 8.30.—On Roman Antiquities at Lydney Park: Rev. W. H. Bathurst.

CHEMICAL SOCIETY, at 8.

LINNEAN SOCIETY, at 8.—On the Tamil names of Plants: Rev. S. Mateer.—Contributions towards a knowledge of the *Curculionidæ*: H. P. Pascoe.

ROYAL INSTITUTION, at 3.—Davy's Discoveries: Dr. Odling.

LONDON INSTITUTION, 7.30.—On the Colonial Question: Prof. J. E. Thorold Rogers.

FRIDAY, MARCH 3.

ROYAL INSTITUTION, at 9.—Pressure of Fired Gunpowder: Capt. Noble.

GEOLOGISTS' ASSOCIATION, at 8.—On the Range in Time of the Foraminifera: Prof T. Rupert Jones, F.G.S.—On the English Crags, considered in reference to the Stratigraphical Divisions indicated by their Invertebrate Fauna: Alfred Bell.

ROYAL COLLEGE OF SURGEONS, at 4.—On the Teeth of Mammalia: Prof. Flower.

SATURDAY, MARCH 4.

ROYAL INSTITUTION, at 3.—Socrates: Prof. Jowett.

SUNDAY, MARCH 5.

SUNDAY LECTURE SOCIETY, at 3.30.—Iceland: its Physical Features, Volcanoes, Hot Springs, &c.: Jon A. Hjaltalin.

MONDAY, MARCH 6.

ROYAL INSTITUTION, at 2.—General Monthly Meeting.

ENTOMOLOGICAL SOCIETY, at 8.

ROYAL COLLEGE OF SURGEONS, at 4.—On the Teeth of Mammalia: Prof. Flower.

LONDON INSTITUTION, at 4.—On Astronomy: R. A. Proctor, F.R.A.S.

ANTHROPOLOGICAL INSTITUTE, at 8.—On the Racial Aspects of the Franco-Prussian War: J. W. Jackson.

TUESDAY, MARCH 7.

ROYAL INSTITUTION, at 3.—Nutrition of Animals: Dr. Foster.

ZOOLOGICAL SOCIETY, at 9.—Notes on rare or little-known Animals now or lately living in the Society's Gardens: P. L. Sclater.—List of the Lizards belonging to the family *Sepidæ*, with Notes on some of the species: Dr. A. Günther.—On new Insects collected by Dr. John Anderson during the Expedition to Yunan: F. Moore.—Observations on the Record of Accessions to the Gardens of the Zoological Society: Dr. J. E. Gray.

WEDNESDAY, MARCH 8.

SOCIETY OF ARTS, at 8.—The Cultivation and Uses of Sugar-beet in England: Dr. A. Voelcker.

GEOLOGICAL SOCIETY, at 8.

ROYAL COLLEGE OF SURGEONS, at 4.—On the Teeth of Mammalia: Prof. Flower.

ROYAL MICROSCOPICAL SOCIETY, at 8.

PRESS LITERARY FUND, at 3.—Anniversary Meeting.

THURSDAY, MARCH 9.

ROYAL SOCIETY, at 8.30.

SOCIETY OF ANTIQUARIES, at 8.30.

ROYAL INSTITUTION, at 3.—Davy's Discoveries: Dr. Odling.

LONDON MATHEMATICAL SOCIETY, at 8.—Remarks on the Mathematical Classification of Physical Quantities: Dr. Clark Maxwell, F.R.S.—On Skew Cubics: Prof. H. J. S. Smith, F.R.S.

LONDON INSTITUTION, at 7.30.—On the Colonial Question: Prof. J. E. Thorold Rogers, M.A.

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ERRATUM.—Page 322, second column, line 20, for "western or right hand" read "eastern or left hand."